

### REMARKS

Claims 1-11 and 31-51 are presently pending in the application.

**At the outset, it is noted that Information Disclosure Statements were filed on November 20, 2001 and on April 1, 2002. However, the Examiner has not acknowledged the IDSs, nor returned the initialed PTO-1449 forms. Consideration of the IDSs and references cited therein and return of the initialed PTO-1449 forms are respectfully requested.**

The title of the application has been amended to more accurately describe the invention, namely, halogenated calixpyrroles and their uses. Additionally, claim 8 has been amended to incorporate the chemical structure of the fluorinated calix[n]pyrrole. Support for this amendment may be found at least at page 20, lines 6-9. Claims 12-30 have been canceled and rewritten as claims 31-51. More specifically, claims 12 and 13, directed to a method of preparing halogenated calix[n]pyrroles, have been rewritten as claims 31 and 32 (for compounds having  $n = 4 - 8$ ) and claims 50 and 51 (for compounds having  $n = 9 - 12$ ). The structures of the resulting compounds, **I** and **VI**, respectively, are supported in the specification at least at page 20, lines 13-17, page 51, lines 5-11 and in Examples 13 and 14. Although structure **VI** is not depicted *per se* in the specification, it is merely the structure of the compound described at page 20, line 6-9, and is not new matter. Chemical structure **I** and the appropriate description thereof (general or halogenated) have also been incorporated into each of claims 33, 37, 43, and 47. Support for claim 33 may be found at least at page 19, lines 1-28 and page 20, lines 18-22, and for claim 37 at least at page 9, line 1 to page 10, line 16 and at page 20, lines 23-30. The incorporation of the structure to claim 43 may be found in the specification at least at page 9, line 1 to page 10, line 16 and at page 20, line 31 to page 21, line 6. Support for the claim 47 may be found in the specification at least at page 9, line 1 to page 10, line 16 and at page 21, lines 7-10.

Claims 32, 38, 39, 44 and 45 now also recite that the halogen or fluoro substituents are present at the even-numbered R positions of the calix[n]pyrroles. Finally, claim 49 has been amended to add the chemical structures corresponding to compounds **44**, **46**, **48**, **50**, and **52**, which are shown at page 110, lines 8-10, at page 117, lines 1-3 and at page 118, lines 1-3 of the present application. No new matter has been added by these amendments.

Applicants acknowledge the Examiner's allowability of claims 3, 5, and 7 in Paper No. 6. However, the Examiner has formally rejected claims 8, 12-29 and 30 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to recite the structures, and argues that in claims 8 and 12-29, it is not clear where the halogens are on the compounds. The amendments to the re-written claims overcome the rejection, and reconsideration and withdrawal of the § 112 rejection are respectfully requested.

The Examiner has also rejected claims 1, 2, 4, and 8-29 under 35 U.S.C. § 102(a) as being anticipated by either Anzenbacher (C89) ("Anzenbacher") or Sessler (C100) ("Sessler"). The Examiner argues that the references teach the compounds and are available because they are by "others." Applicants respectfully traverse these rejections as follows.

At the outset, the Applicants, in making the arguments below, are not necessarily agreeing that either of Anzenbacher or Sessler is properly cited as prior art against the claims of this application on grounds other than those discussed herein under any sub-part of §102. The Applicants expressly reserve the right to preserve such argument in a subsequent communication.

Both of the cited prior art references, Anzenbacher and Sessler, which were published on October 7 and November 15, 2000, were published prior to the filing date of the present application of August 24, 2001. However, the present application is a continuation-in-

part of U.S. Patent Application No. 08/883,379, filed June 26, 1997 ("the parent application"). Accordingly, neither Anzenbacher nor Sessler is prior art for any claim which is supported in the parent application. Further, Applicants respectfully submit that all elements of at least the remaining claims are not taught or suggested by either Anzenbacher or Sessler as follows.

Claim 1 is directed to  $\beta$ -substituted calix[n]pyrroles having structure **I**, in which  $n = 4-8$  and all of the even numbered R substituents are fluoro, chloro, or bromo, odd-numbered R substituents are listed in paragraph i), and  $R_A-R_H$ , where applicable, are listed in paragraph ii). Claims 2, 4, and 9-11 are similarly directed to compounds having structure **I**, but more specifically limit the number of pyrrole rings "n" (claims 2, 4, and 9-11), or limit the even-numbered R substituents to fluoro (claim 4).

Similarly, calix[n]pyrroles having structure **I** are depicted at page 8, line 13 of the parent application. It is taught that "n" may be 4, 5, 6, 7, or 8; all numbered R substituents are selected from paragraph i) at page 9, lines 11-18, which includes halides, and  $R_A-R_H$ , as appropriate, are selected from paragraph ii) at page 9, lines 19-21, which is identical to the paragraph ii) in the present claims. At page 22, lines 19-20, it is taught that the halide substituents may be chloride, bromide, fluoride, or iodide. Further, an exemplary compound **14**, described at page 28, line 9 and pictured at page 58, line 16, has  $n = 4$  and contains bromo substituents at all even-numbered R positions. All elements of claims 1, 2, 4, and 9-11 are thus fully supported in the parent application.

Claim 6, which recites "a composition comprising the compound of claim 1 incorporated into a membrane," was not allowed or rejected by the Examiner in Paper No. 6, and thus is assumed to be allowable. Regardless, claim 6 is fully supported in the specification

of the parent application, at least at page 37, lines 25-26, and thus neither of the cited references would be prior art against claim 6.

Claims 31 and 32 (formerly claims 12 and 13), are directed to a method of making a halogenated calix[n]pyrrole in which  $n = 4 - 8$ , and are supported in the parent application at least at page 30, lines 1-11, which teach the synthesis of  $\beta$ -substituted calix[n]pyrroles having  $n = 4 - 8$ . The method involves reacting a  $\beta$ -substituted pyrrole with a ketone in the presence of a Bronsted acid; exemplary  $\beta$ -substituted pyrroles are those having substituents at the 3 and 4 positions. Accordingly, the claimed 3,4-dihalopyrrole falls within the broader disclosure of " $\beta$ -substituted pyrrole." Further, claims 31 and 32 recite that the halogenated calix[n]pyrrole has halogen (claim 31) or more specifically fluoro (claim 32) substituents at the  $\beta$  positions. As previously explained, such  $\beta$ -substituted calix[n]pyrroles are within the scope of structure **I** and are supported in the parent application. Accordingly, all of the elements of claims 31 and 32 are supported in the parent application.

Claims 33-36 (formerly claims 14 -17) are directed to a method of removing an anion from an environment by contacting the environment with a halogenated calix[n]pyrrole having structure **I**, which binds the anion. The anion may be an environmental pollutant (claim 34), fluoride, chloride, or phosphate (claim 35), or pertechnetate (claim 36). It is taught in the parent application at page 35, lines 15-20 that the macrocycles according to the invention, which include halogenated calix[n]pyrroles having structure **I**, provide new principles for the separation of ions and molecules, including phosphate (page 36, line 14). A method of forming a complex of calix[n]pyrrole and an anion is also described at page 37, lines 20-23, and Example 10 at pages 82-89 describes the binding of calix[n]pyrroles and the separation of ionic substrates. In Table 8, representative anions include fluoride, chloride, and dihydrogen phosphate. Further, a

method of removing an environmental pollutant from an environmental source by containing the source with a calix[n]pyrrole is described at page 38, lines 2-6. The pollutant may be pertechnetate (page 37, line 33 to page 38, line 2; page 38, line 7; and Example 12), for example. Accordingly, claims 33-36 are supported in the parent application.

Finally, claim 49 (formerly claim 30) recites compounds having structures 44, 46, 48, 50, and 52, which are fluorinated calix[n]pyrroles having  $n = 4, 5, 6, 7$ , or 8. Although the specific structures are not depicted in the parent application, each of these structures falls within the scope of structure I, in which  $n = 4-8$  and all of the even-numbered R substituents may be halides, such as fluorine. Accordingly, claim 49 is fully supported in the parent application.

In sum, Applicants respectfully submit that neither Anzenbacher nor Sessler is prior art against claims 1, 2, 4, 6, 9-11, 31-36 or 49, and reconsideration and withdrawal of the § 102(a) rejections relating to these claims are respectfully requested.

Regarding the remaining claims, neither Anzenbacher nor Sessler teaches or suggests all of the claimed elements, and thus none of the remaining claims is anticipated by either reference. For example, claim 8 recites a fluorinated calix[n]pyrrole having structure VI, in which  $n = 9-12$ , and the calix[n]pyrrole recited in claim 10 has  $n = 6$  or 7. In contrast, the fluorinated calix[n]pyrrole compounds taught by Anzenbacher would have  $n = 4$  in structure I, whereas those described by Sessler contain  $n = 5$  and 8. Not only does neither reference suggest compounds having  $n = 6, 7$ , or 9-12 as claimed, but the synthesis of chemical compounds is often unpredictable. As described in example 14 of the present application, it was necessary to vary the reaction conditions in order to obtain the various calix[n]pyrroles. Similarly, method claims 50 and 51 are directed to a method for preparing calix[n]pyrroles having structure VI with  $n = 9-12$ , and thus are also not taught or suggested by either of the cited references.

Claims 37-42 (formerly 18-23) recite a method for extracting an ion pair from an environment using a calix[n]pyrrole having structure I and a cation coextractant, which may be a crown ether, calixarene-crown ether cryptand, or a calixarene-crown ether conjugate (claim 41) or a cation exchanger (claims 42). Neither Anzenbacher nor Sessler teaches or suggests extraction of an ion pair or any type of cation coextractant.


Finally, claims 43-46 (formerly 24-27) are directed to a method for reducing or preventing corrosion on a substrate susceptible to corrosion using a calix[n]pyrrole having structure I. Despite the Examiner's contention to the contrary, such a method is not taught or suggested by either of Anzenbacher or Sessler. Similarly, claims 47 and 48 (formerly 28 and 29), directed to a method for producing a naked cation in solution using a compound having structure I, are also not taught or suggested by the cited references. Although the Examiner argues that the references anticipate these claims, the Examiner has not shown where in the references any of the elements of the rejected claims are taught or suggested.

In sum, all of the pending claims which were rejected by the Examiner are either not taught or suggested by the cited references (claims 8, 37-48 and 50-51) or are supported in the specification of the parent application (claims 1, 2, 4, 6, 9-11, 31-36 and 49), such that the cited references are not prior art against these claims. It is thus submitted that all of claims 1-11 and 31-51 are not anticipated by either Anzenbacher or Sessler, and reconsideration and withdrawal of the § 102(a) rejections are respectfully requested.

In view of the preceding Amendments and Remarks, it is respectfully submitted that all of the pending claims are in compliance with § 112, patentable, distinct from the cited prior art of record, and in condition for allowance. A Notice of Allowance is respectfully requested.

Respectfully submitted,

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Enclosure: Marked-up Version of Specification section and claim 8  
Petition for Extension of Time (three months)  
Amendment Transmittal



**Marked-up Version of Specification Section and Claim 8**

Please amend the "Title of the Invention" to read as follows:

--Halogenated Calixpyrroles[, Calixpyridinopyrroles and Calixpyridines,] and  
Uses Thereof"--

**In the claims:**

Please amend claim 8 to read as follows:

--8. (Amended) A compound comprising a fluorinated calix[n]pyrrole having  
structure VI:





and  $R_A - R_J$  are independently substituents as listed in paragraph ii) below;

when n is 11;  $t = u = v = 1$ ,  $w = 0$ , even numbered R substituents are fluoro, odd numbered R substituents are independently as listed in paragraph i) below, and  $R_A - R_K$  are independently substituents as listed in paragraph ii) below;

when n is 12;  $t = u = v = w = 1$ , even numbered R substituents are fluoro, odd numbered R substituents are independently as listed in paragraph i) below, and  $R_A - R_L$  are independently substituents as listed in paragraph ii) below;

i) alkyl, alkenyl, alkynyl, aryl, alkylaryl, formyl, acyl, hydroxyalkyl, hydroxyalkoxy, hydroxyalkenyl, hydroxyalkynyl, saccharide, carboxy, carboxyalkyl, carboxamide, carboxamidealkyl, alkyl sulfoxide, alkyl sulfone, alkyl sulfide, tetrahydropyran, tetrahydrothiapyran, thioalkyl, haloalkyl, haloalkenyl, haloalkynyl, alkyl ester, a site-directing molecule, a catalytic group, a reporter group, a binding agent, or a couple that is coupled to a site-directing molecule, to a catalytic group, to a reporter group, or to a binding agent;

ii) hydrogen, alkyl, aminoalkyl, alkylsulfone, carboxy alkyl, carboxamidealkyl, phospho alkyl, alkyl sulfoxide, alkyl sulfone, alkyl sulfide, haloalkyl, aryl, N-oxide, dialkylamino, carbamate, or arylsulfonyl.--